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PASTURE GRASSES.
LEGUMINOUS CROPS.
CANTALOUPE BLIGHT.

By H. H. GRIFFIN.

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PASTURE GRASSES FOR THE ARKANSAS VALLEY.

BY H. H. GRIFFIN.

For years there has been considerable inquiry in regard to pasture grasses for this valley. The farmer is often heard to remark "I wish I could get something on which to pasture a cow, this alfalfa is so dangerous."

Almost since the establishment of the substation pasture grasses have been tested for their adaptability to this section, but one of which has been reported upon in bulletin form, viz: Bromus inermis in Bulletin 61.

The behavior of other grasses has been reported from time to time in the annual reports but this information is not generally accessible to the public.

Enough data has now been obtained in regard to the adaptability of all of the most important grasses, to warrant publication.

The theory of permanent pastures is a very fine one. Farmers are more and more giving up the idea on lands under irrigation. I believe the farmer can get more feed and much greater returns from the land in a regular rotation of crops. One acre of alfalfa cut and properly fed will keep an animal the year round. With pastures, much more land must be devoted to one animal.

It will not pay the small farmer to devote much land to pasture. There are others having larger farms who do not look so closely to the return per acre, who do desire some grass for stock pasture. Often there are waste lands or tree claims that can be devoted to pasture.

The first work in testing grasses was done in 1891. Mr. Huntley, then superintendent, reports on these in the annual report of the Experiment Station for 1894 as follows:

"Based upon trials of three years' duration, but two grasses out of eight tried, have given promise of enduring field culture for pasture. They are Bromus and Orchard grass. The unsuccessful ones were, Hard Fescue, Meadow Fescue, Perennial Rye grass, Italian Rye grass, Red Top and Blue grass. It is quite probable some of these would succeed in moist soils of other localities in the state."

The report for 1895 mentions only the Bromus and Orchard grass as making good showing that season.

The varieties tested in addition to those above mentioned since the writer took charge in 1898 are, the Tall Oat grass and Meadow Fescue (*Festuca elatior*) sometimes called English Blue grass.

Bromus inermis has been quite extensively reported upon in Bulletin 61 and the reader is referred to it for information. It may be said that the results in 1901 confirm the report made of it in bulletin 61.

Orchard grass, Tall Meadow Fescue, Tall Oat grass and Blue grass comprise the list of grasses that may be profitably grown here for pasture.

ORCHARD GRASS. (*Dactylis glomerata.*)

This grass is uniformly successful in the Arkansas valley, whether sown on the dry uplands, in timber claims or in moister lands. It is a tall grass growing in clumps but is valuable for either pasture or hay. It may be sown profitably with alfalfa. It matures with the first crop and would improve the quality of the hay for feeding horses.

This grass is easily started and does not need nursing to get it established; it resists drouth and hot weather well. It is one of the first things to appear in the spring. When pastured off, it soon starts growing again.

Owing to its nature to grow in tussocks, it is advisable to sow some other grass with it to occupy the intervening spaces. Either the Tall Oat grass or the Tall Fescue is adapted to the purpose, preferably the latter.

Orchard grass, like many others here, does not fail to grow some during the hot weather. It also stands irrigation well, not becoming sod bound.

About 25 pounds of seed per acre should be sown.

TALL MEADOW FESCUE. (*Festuca elatior.*)

This grass is sometimes called English Blue grass. In ordering the seed of this grass it must not be confounded with another grass called Meadow Fescue (*F. pratensis*) in the catalogues.

The latter kind has never been successful at the station.

Tall Fescue has not been under trial so long as the Orchard grass but its value has been fully demonstrated to the uplands of this section. It forms a thick vegetation and is so persistent as to gradually thicken up; the seed shoot growing about two feet in height.

Reports from the Kansas Experiment Station speak well of it.

It is a valuable grass in the Arkansas Valley; alone, or in combination with others.

Sow about 25 pounds of seed per acre.

TALL OAT GRASS. (*Avena elatior.*)

This grass is largely grown in the southern states where it is highly valued.

It does well in this valley but does better if sown in mixture with Orchard grass. It has been difficult to get a good stand of this grass owing to the poor germinating power of the seed.

This grass will remain partially green nearly all winter and will commence growth very early in spring.

All reports of this grass with which I am familiar give it very high nutritive qualities. At least two bushels of seed should be sown per acre.

KENTUCKY BLUE GRASS. (*Poa pratensis.*)

Climate has much to do with pasture grasses. It is a well known fact that Blue grass cannot stand hard use and long continued dry hot weather. It is said "whoever has limestone land has Blue grass," and while we have plenty of lime in the soils of this section, yet Blue grass cannot be relied upon for pasture, owing to the vast amount of irrigation it requires to keep it thrifty. Nearly everyone is aware how much irrigation this grass requires when it is grown for lawn, which is sufficient demonstration that under but few conditions can it be relied upon for pasture.

Lands having considerable clay or adobe with an abundant water supply will produce this grass in sufficient quantity to make good pasture. But put under conditions where it must withstand drouth it will perish at a time when Orchard grass or Tall Fescue would be in good condition.

In most instances it will require considerable nursing to secure a stand and it is only when ornament and utility are both desired that it is advisable to grow Blue grass for pasture.

RED TOP. (*Agrostis vulgaris.*)

This grass has not been a success on the dry upland soils of the station.

I see no reason why this grass should not succeed upon some of the moist low lands and sub-irrigated lands of this valley. The writer has seen this grass succeed in other localities under similar climatic and soil conditions to those above mentioned.

TIMOTHY. (*Phleum pratense.*)

Timothy is not a success on the uplands and it can hardly be said to be on any lands in the valley.

I do not believe the returns will warrant sowing it at all.

WHEN TO SOW GRASS SEED.

There are two times of year only when grass seed may be sown with good success in this country, viz: March and August.

By sowing in the former month, the grass gets a start before the weeds come on to choke it out and besides it will sometimes get the benefit of April storms.

In many respects August is the preferable time to sow. There are no weeds or foreign grass to choke the young grass. The weather becomes cooler and damper and the young plant receives the benefit of summer rains that usually occur.

The plant gets well established before winter and starts the next spring strong and vigorous to take possession of the land.

If sown in August, the farmer may take a grain crop from the land previous to sowing, but if the grass is sown in the spring the season is lost for anything but the grass.

FALL SEEDING OF ALFALFA.

Sometimes conditions of crops and labor are such that the farmer wishes to sow alfalfa in the fall. He wishes to know if it may be done with impunity.

In the first week of September 1898 the station sowed three acres to alfalfa. This was just preceeding the severe winter of 1898-99 in which the thermometer registered -32°. A good rain came soon after the seed was sown and the seed came up nicely, the plants getting about two inches high when winter set in. A few spots died out during the winter but the greater part of it stood the extreme cold weather well.

The weather conditions that winter were the worst ever recorded in this country and the results seem to indicate that alfalfa may be sown in August or early September with impunity.

The rules given for the sowing of grass seed hold good in regard to the sowing of alfalfa seed.

LEGUMINOUS CROPS FOR THE ARKANSAS VALLEY.

BY H. H. GRIFFIN.

For three seasons the sub-station has been testing leguminous plants to ascertain what may be expected of them in this valley. The main object has been fertility, but incidentally their value for forage, for bees and mulch or cover crops for the soil.

The plants under investigation are the Serradella, Red Clover, Cow pea, Field pea, Soy bean and Hairy vetch.

SERRADELLA. (*Ornithopus sativus.*)

The Station failed to secure a single plant of this legume. The writer has seen other trials in the arid region with this plant but has never seen them successful. The plant does not seem to be adapted to arid conditions.

RED CLOVER. (*Trifolium pratense.*)

This legume does not thrive under our arid conditions. However, in old orchards where there is partial shade, or in open fields where the soil is rather heavy and water supply abundant, some success may be secured with Red Clover.

To be of much value as a fertilizing plant it must occupy the land for at least three years and as there is not much revenue from it in the interim, it becomes an expensive plant to grow for field fertilizing.

The only place for which we can recommend it at all is old orchards and it is doubtful whether it is advisable to use there, as there are other plants better adapted to our conditions.

COW PEA. (*Vigna catjang.*)

This is a valuable plant for the Arkansas Valley. The Station has tested the Whipporwill, Black, Clay and New Era varieties. The former we consider the most desirable owing to its upright growth. This variety will ripen if sown as late as the last of May.

As high as two tons of hay per acre have been cut on land devoted to this plant, besides leaving a considerable

quantity of vegetation to be incorporated with the soil. The roots are well supplied with tubercles. It will produce from 6 to 10 bushels of seed per acre, which is relished by poultry or hogs, and about two tons of hay.

The New Era variety will mature seed in about one month less time than the Whipporwill and may meet a demand for late sowing in orchards. It does not grow nearly so rank as the Whipporwill.

This plant should be sown in drills from 22 to 32 inches apart. The work may be done by a grain or beet drill. One or two early cultivations should be given, after which it will cover the ground. This plant can be sown as late as the first of July where intended only for fertilizing purposes. It is a splendid plant to sow in orchards to relieve the trees from the reflection of the sun in late summer, winter and early spring, after which it may be plowed under as a fertilizer.

Two plats, one-tenth acre each, that produced Cow peas in 1900, were devoted to the growth of beets in 1901. The peas were cut with a mower so that only the roots and stubble remained to plow under. Two plats of the same size that had never been fertilized, and which had grown crops similar to those on which the Cow peas were sown, were planted to beets also for comparison. Both plats were given the same treatment. The plats on which the Cow peas had been grown yielded 16 tons per acre, the other plats yielded 12.5 tons per acre. That the nitrogen supply was augmented by the growth of the peas was apparent from the color and vigor of the beet tops.

THE FIELD PEA. (*Pisum arvense.*)

The Field pea does fairly well at Rocky Ford if sown very early in spring, so that its growth may be made before the approach of hot weather.

The seed should be sown the latter part of March. The peas will ripen the first week in July.

The yield on the Station grounds in 1901 was 23 bushels from two acres. The yield in 1899 was at the rate of 16 bushels of seed per acre. In addition to the yield of grain there was produced at least 3 tons of splendid feed on the two acres. The above returns are only medium, for in neither case were the conditions such as to give the best returns

The variety grown in 1899 was the "Mummy;" that grown in 1901 was the "Marrowfat." I consider either of them preferable to the Canada pea for this section.

This pea may be sown with oats early in the spring; the product cut for hay late in June and the ground devoted to some other nitrogen gathering crop for the remainder of the season.

From 100 to 120 pounds of seed should be used per acre. I think the most desirable way to cover the seed is to plow it under.

THE SOY BEAN. (*Glycine hispida.*)

The Soy bean is an upright, bushy, leafy plant growing about 3 feet high and requiring about 100 days to mature.

The station has grown the Early Yellow and the Medium Early Green.

The bean of this plant is extremely rich in protein and is especially desirable for combining with corn or sugar beets for pork production. When utilized this way no threshing is required.

The Kansas Experiment station has made some extensive experiments with Soy beans in combination with other foods (especially Kaffir-corn) for feeding pigs. The results are reported in Bulletin 95, and show a gain of 96 per cent. by the substitution of one-fifth Soy bean meal to a Kaffir-corn ration.

This plant resists drouth well; the Kansas station claims it is fully equal to Kaffir-corn or sorghum in this respect.

The Soy bean may profitably be grown under many ditches with scant water supply, in place of corn, especially if the soil is rather light and needs improving in fertility.

The seed should be sown with a grain or beet drill about the middle of May, putting the rows from 22 to 32 inches apart. About 40 pounds of seed per acre is required. The yield ranges from 10 to 25 bushels per acre. The harvesting should be done before the pods begin to turn yellow or great loss will ensue from the popping open of the pods. But one crop can be grown in one season on land devoted to this bean, owing to the time required to mature it.

Land devoted to Soy beans in 1900 and planted to sugar beets in 1901, gave as high as 6 tons greater yield than adjacent land having no fertilizer applied.

HAIRY VETCH. (*Vicia villosa.*)

Hairy Vetch is known as Sand, Winter, or Russiar Vetch.

Some of the farmers of the Arkansas Valley have expressed their desire for a plant that may be sown in the fall, after taking a crop from the land, and make sufficient growth to turn under in the spring, thus adding fertility to the soil.

Hairy Vetch meets this demand admirably. It will make growth in this valley during all but the severest part of the winter. It makes its poorest showing during the heat of summer. For this reason it is preferable to sow in late summer or fall.

The station has secured good results from sowing as late as October first.

In one instance the seed lay in the soil over winter and germinated with the first approach of spring; the plants produced seed in July, but of course the results are not so good as where the plants become well established before winter.

The Hairy Vetch will thrive on the lightest kind of sandy soils and where sown in the fall, will keep such lands from blowing during the spring months, afterwards adding a vast amount of humus and fertility to them. The roots are bountifully supplied with tubercles. If this plant is sown in early September it will produce a considerable growth to plow under in April or May, or if allowed to ripen will do so in early July. It will bloom, about the middle of May and from that time on until it ripens is a vast profusion of bloom. Bees frequent it in great numbers, seeming to do so to the exclusion of most other plants. Early fall sowing makes splendid pasture during April and May, and if the plant is started in the summer it will furnish pasture in February or March.

Six-sevenths of an acre was sown to this seed, August 11, 1899. By May 12, 1900, it stood two feet high and commenced to bloom. The seed was ripe the first week in July, at which time it was cut.

The yield of straw was 3000 pounds, which yielded 400 pounds of seed. July 26, the same land was prepared by a disc harrow and watered, and from the seed that scattered off, a good stand of the vetch was secured, which was allowed to grow until April 1901, when it was plowed under and the land seeded to beets.

Two acres near by were given a dressing of ten loads of sheep manure per acre and one acre was left without manure as a check.

The tops of the beets on the vetch land grew rank and thrifty, having the dark healthy green and much of the appearance of beets on alfalfa land.

The results show a heavier yield than was obtained from the use of manure and as much as 50 per cent, increase over the land not fertilized.

Trials in 1901 show further, that the vetch may be sown with oats and be cut with them for hay in July, after which it will produce seed.

This plant may be sown in orchards late in summer and make a splendid cover crop to overcome reflection from the snow in winter and early spring, after which it may be plowed under, adding much fertility to the soil.

The plant is easily destroyed and in no sense will become a nuisance.

It is already apparent that the farmers of the Arkansas Valley must fertilize and rotate crops if success is to be obtained. The larger farms are being more and more cut up into smaller ones.

On small farms alfalfa cannot be grown to advantage; it takes too long to get it established and after it is well established, it is difficult to eradicate.

The small farmer should get the best possible results from his farm, and if leguminous crops can be so combined that he may take two crops from the same land in one year, they will be of profit to him.

The following outline will briefly show how some of the crops above mentioned may be combined as fertilizers: Field peas may be sown early in spring with oats and cut for hay the latter part of June. The ground may then be planted to Mexican beans.

Field peas may be sown early and allowed to ripen seed, after which the land may be devoted to Cow-peas which may be either turned under or cut for hay.

Hairy Vetch may be sown in the fall and plowed under in the following spring. Mexican beans or Cow-peas may follow it.

Cow-peas may be sown quite early in the spring and cut for hay, after which the land may be sown to vetch and the growth turned under the following spring.

By some such system of cropping as outlined above, the farmer can make his supply of yard manure do much greater service.

The above mentioned crops will enter nicely into a 3 or 4 year rotation with cantaloupes, beets or tomatoes.

CANTALOUPE BLIGHT IN 1901.

BY H. H GRIFFIN.

Bulletin No. 62, gave full information of our results looking to the control of the cantaloupe blight, closing with the season of 1900.

The work in 1901 was planned as follows: To treat the seed with Bordeaux mixture to control the blight; to determine at what stage of growth the spraying should be done to be most efficient

The work attempted on the station grounds was destroyed by a hailstorm the 24th day of July. Some knowledge was gained of the efficacy of early spraying in a field belonging to a Mr. Dixon. He had sprayed one part of his field twice and another part three times. The first spraying was done when the vines had started to run slightly. The second spraying was done about the time the melons were setting on the vines, the third about the time picking for market commenced.

At the time I saw the field (first of September) there was a marked difference in the vines in the two lots. Those sprayed early (hence had the three sprayings) were in much the better condition, and Mr. Dixon said the melons were of better quality. Mr. Dixon has used the Bordeaux spray for two seasons and is very enthusiastic over the benefits to be derived from its use for control of cantaloupe blight.

Another field that was given one spraying late in July, was thrifty and bearing splendid melons (August 26) when fields across the fence had been abandoned for ten days, both fields having produced melons the previous year.

The sprayed field was also near two fields of melons growing on alfalfa sod that about September first were apparently in the best of condition. By Sept. 18th, the fields on the alfalfa sod were almost destroyed by the blight, while the sprayed field remained in quite good condition and was yielding melons of good quality. The sprayed field of 14 acres, yielded 3300 crates of marketable melons Mr. Crum, the owner, after two years' trial of the spray, is well pleased with the results.

After the destruction of the vines on the station grounds a part of an adjoining field was sprayed. This had been

heavily manured with sheep manure and was planted the last of May. The work was done July 30th, at which time the vines were almost covering the ground.

About the 25th of August, the blight was making rapid progress in all melon fields. The benefit derived from the spraying in this field was especially well marked. About Sept. 1, the unsprayed vines were giving up fully twice as many melons per day as the sprayed vines. The latter were ripening somewhat as they would under normal conditions, but the others, both vine and fruit, were deteriorating rapidly.

A portion of a field on the station that was planted the first of June, and which recuperated after the hail, was given two sprayings, one late in September and again about ten days after. The results confirm the results given elsewhere in regard to the efficacy of the Bordeaux for the control of the blight.

That nothing but fresh lime should be used in the preparation of the Bordeaux was especially emphasized in this work. We used some air slaked lime, as it happened to be at hand, and a portion of the vines were badly injured by the spray, giving them much the appearance of a bad case of blight. There was one significant feature of this, the vines that were apparently badly injured by the spray recuperated and looked well afterwards, while those attacked by blight grew worse.

There is evidence that the blight is more than a local trouble. The writer happened to visit some melon fields in the vicinity of Brighton, about September first, and there saw the blight doing serious injury. Reports and specimens of melon leaves sent me from Grand Junction indicate that the disease is well established there. The observations of this year verify those of last year in that the disease is well distributed over the entire Arkansas valley. Both the farmers and the shipping agents realize that the trouble is a serious one and are considering its consequences. That the trouble was only temporary is no longer held as a tenable opinion, but rather one demanding such treatment as will lessen its ravages.

The weather conditions have been the most favorable for a study of the disease of any I have ever had in that it was more of a typical season. Two of the former seasons were extremely wet during July and August and that of 1900 was very dry. The rain of the last season was moderate in amount and well distributed. Two features were prominently brought out this year. One was to avoid the use of any heating manure previous to planting melons and the

other was the necessity for rotation of other crops with cantaloupes. A comparison of cantaloupe fields in close proximity, some of which were on alfalfa sod, some on grain land and others on cantaloupe ground, revealed the great benefits to be derived from the use of the alfalfa land. Land that had been in melons for a number of years showed the blight in about the same ratio as the number of years to which the land had been cropped to melons. Heating sheep manure is especially undesirable to precede melons.

I had under observation, this year, one field in which the seed had been planted March 28. April 18 the seed was practically in the same condition as when planted. April 27 the seed was irrigated; many of the seed sprouted but no plants up. May 8 some of the plants were up and had the third leaf, others were just coming up, while about one-third of the field had to be replanted. The first ripe melon was taken July 27.

Comparing this field with others the conclusion can be aptly drawn that had the planting been done one month later the results would have been fully as good, if not better Last Spring was one of the most favorable of springs for extremely early planting.

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